

Claims

1. A printing device, having at least one electro-photographic printing unit (10.1), to which a transfer medium (12) for transferring a toner powder to respectively one substrate (14.1, ..., 14.5, 14.6) in a transfer zone is assigned, wherein one or several substrates (14.1, ..., 14.5, 14.6) can be conducted through the transfer zone by means of a transport system (16),

characterized in that

the transport system (16) for the one or for every substrate (14.1, ..., 14.5, 14.6) each has a receiving device (18.1, ..., 18.5, 18.6) which can be heated, to which one or several heating elements (20.1, ..., 20.5, 20.6) for introducing heat energy into the substrate (14.1, ..., 14.5, 14.6) are assigned, and

a cooling device (28) is assigned to the transfer medium (12) of the one or of every printing unit, which removes heat energy from the transfer medium (12).

2. The printing device in accordance with claim 1, characterized in that

the or every heating element (20.1, ..., 20.5, 20.6) is arranged on the side of the substrate (14.1, ..., 14.5, 14.6) facing away from the or from every receiving device (18.1, ..., 18.5, 18.6) of the transport system (16).

3. The printing device in accordance with claim 1 or 2,

characterized in that

the or every substrate (14.1, ..., 14.5, 14.6) is fixed in place supported at least partially on the or on every receiving device (18.1, ..., 18.5, 18.6).

4. The printing device in accordance with one of claims 1 to 3,

characterized in that

the or every receiving device (18.1, ..., 18.5, 18.6) has an approximately frame-shaped receiving structure for supporting respectively one substrate (14.1, ..., 14.5, 14.6).

5. The printing device in accordance with one of claims 1 to 4,

characterized by

a plurality of printing units (10.1, ..., 10.5, 10.6) arranged one behind the other for imprinting the or every (14.1, ..., 14.5, 14.6), each in a different color.

6. The printing device in accordance with one of claims 1 to 5,

characterized in that

the transport system (16) conducts a plurality of substrates (14.1, ..., 14.5, 14.6) arranged one behind the other through the transfer zones of each one of the printing units (10.1, ..., 10.5, 10.6).

7. The printing device in accordance with one of claims 1 to 6,

characterized in that

the transport system (16) moves the or every substrate

(14.1, ..., 14.5, 14.6) continuously on.

8. The printing device in accordance with one of claims 1 to 7,

characterized in that,

upstream of the first printing unit (10.1) of the printing units (10.1, ..., 10.5, 10.6) arranged one behind the other in the transport direction (A) of the or every receiving device (18.1, ..., 18.5, 18.6), the or every substrate (14.1, ..., 14.5, 14.6) can be received in a separate receiving device (18.1, ..., 18.5, 18.6) and can be sequentially conducted to the printing units (10.1, ..., 10.5, 10.6).

9. The printing device in accordance with one of claims 1 to 8,

characterized in that,

downstream of the last printing unit (10.6) of the printing units (10.1, ..., 10.5, 10.6) arranged one behind the other in the transport direction (A) of the or every receiving device (18.1, ..., 18.5, 18.6), the or every substrate (14.1, ..., 14.5, 14.6) can be removed from the respective receiving device (18.1, ..., 18.5, 18.6).

10. The printing device in accordance with one of claims 1 to 9,

characterized in that,

following the removal from the receiving device (18.1, ..., 18.5, 18.6), the or every substrate (14.1, ..., 14.5, 14.6) can be transferred to a transfer unit or a sorting unit.

11. The printing device in accordance with one of claims 1 to 10,

characterized in that

the transport system (16) has a conveying device (50), which transports the or every receiving device (18.1, ..., 18.5, 18.6) along a guidance arrangement (52).

12. The printing device in accordance with one of claims 1 to 11,

characterized in that

the conveying device (50) has at least one toothed belt, belt, or like conveying element.

13. The printing device in accordance with one of claims 1 to 13,

characterized in that

the guidance device can be an arrangement of guide rods (52) or guide rails, or the like guide elements.

14. The printing device in accordance with one of claims 1 to 13,

characterized in that

the guidance arrangement (52) can constitute a closed track, or a conveying circuit, for conveying the or every receiving device (18.1, ..., 18.5, 18.6).

15. The printing device in accordance with one of claims 1 to 14,

characterized in that

a cleaning device (54) for the or every receiving device (18.1, ..., 18.5, 18.6) is arranged at the closed

track or the conveying circuit.

16. The printing device in accordance with one of claims 1 to 15,

characterized in that

the cleaning device (54) is arranged following the last printing unit (10.6) of the printing units (10.1, ..., 10.5, 10.6) arranged one behind the other in the conveying direction of the or every receiving device (18.1, ..., 18.5, 18.6), and the or every receiving device (18.1, ..., 18.5, 18.6) can be introduced into the cleaning installation (54) following the removal of the or every substrate 14.1, ..., 14.5, 14.6).

17. The printing device in accordance with one of claims 1 to 16,

characterized in that

the cleaning device (54) is arranged upstream of the first printing unit (10.1) of the printing units (10.1, ..., 10.5, 10.6) arranged one behind the other in the conveying direction (A) of the or every receiving device (18.1, ..., 18.5, 18.6).

18. The printing device in accordance with one of claims 1 to 17,

characterized in that

the or every substrate (14.1, ..., 14.5, 14.6) can be respectively received in a separate receiving device (18.1, ..., 18.5, 18.6) downstream of the cleaning device (54) and upstream of the first printing unit (10.1) of the printing units (10.1, ..., 10.5, 10.6) in the conveying direction (A)

of the or every receiving device (18.1, ..., 18.5, 18.6).

19. The printing device in accordance with one of claims 1 to 18,

characterized in that

the transfer medium (12) is embodied as a transfer roller or transfer belt containing at least a portion of the cooling device (12).

20. The printing device in accordance with one of claims 1 to 19,

characterized in that

the transfer medium (120 of the or every printing unit (10.1, ..., 10.5, 10.6) has a lower temperature in the transfer zone formed with the or every substrate (14.1, ..., 14.5, 14.6), at least in the area of the contact surface, than the surface of the substrate (14.1, ..., 14.5, 14.6).

21. The printing device in accordance with one of claims 1 to 20,

characterized in that

the or every substrate (14.1, ..., 14.5, 14.6) rests on a conductive support of the receiving device (18.1, ..., 18.5, 18.6), and that the support is charged with a reversed polarity sign compared with the charge of the toner.

22. The printing device in accordance with one of claims 1 to 21,

characterized in that

the or every substrate (14.1, ..., 14.5, 14.6) is moved by means of the transport system (16) past the transfer

medium (12) synchronously with the circumferential speed of the transfer medium (12), and that a voltage which, in respect to the transfer medium, is opposite to the charge of the toner, is applied to the or every receiving device (18.1, ..., 18.5, 18.6) in the transport system (16).

23. The printing device in accordance with one of claims 1 to 22,

characterized in that

each substrate (14.1, ..., 14.5, 14.6) can be charged by means of one or several heating elements (20.1, ..., 20.5, 20.6) embodied as infrared radiation devices and/or as hot-air blowers and/or by means of charging with heat energy.

24. The printing device in accordance with one of claims 1 to 22,

characterized in that

each substrate (14.1, ..., 14.5, 14.6) can be charged with heat energy by means of metal tape heating or metal foil heating device, wherein the wavelength of the heat radiation can be exactly matched to the absorption maximum of the substrate and/or of the plastic matrix of the toner.

25. The printing device in accordance with one of claims 1 to 24,

characterized in that

a temperature sensor (26) is assigned to the or every substrate (14.1, ..., 14.5, 14.6), and that the heating element (20.1, ..., 20.5, 20.6) and/or the transport system (16) can be controlled by means of a control device (24) as a function of the signal emitted by the temperature sensor

(26) .

26. The printing device in accordance with one of claims 1 to 25,

characterized in that

the temperature sensor (26) is a pyrometer.

27. The printing device in accordance with one of claims 1 to 26,

characterized in that

a conditioned air flow is directed onto the surface of the transfer medium (12), and/or one or several liquid-cooled contact rollers of the cooling device (28) roll off on the transfer medium (12).

28. The printing device in accordance with one of claims 1 to 27,

characterized in that

the cooling device (28) removes heat energy from the transfer medium (12) downstream of the transfer zone and upstream of the photo-conductor (30) of the printing unit (10.1), viewed in the transport direction of the transfer medium (12).